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REMARKS

Claims 1 through 11 and new Claims 12 and 14 are pending in the application.

Claim 1 has been amended to positively recite that the agricultural livestock feedstuffs include an animal feedstuff. Support for this amendment can be found in the Application-as-filed, for example on Page 6, lines 17 through 20.

Claims 1, 8 and 10 have been amended to reflect that the sorbic acid amount is based on the weight of the feedstuff. Support for this amendment can be found in the Application-as-filed, for example on Page 4, lines 14 through 16.

Claim 3 has been amended to remove amylase as an enzyme.

Claims 8 and 10 have been amended to reflect that the methods and additives of the invention are advantageously directed to agricultural livestock. Support for this amendment can be found in the Application-as-filed, for example on Page 1, lines 4 through 6.

Claims 8 and 10 have also been amended to address antecedent basis issues.

Claims 12 and 13 have been added to complete the record for examination and highlight particularly advantageous embodiments of the invention.

Claim 12 is directed to advantageous agricultural livestock feedstuffs that include solid feed additive formed from a combination of sorbic acid and at least one active enzyme, in which the concentration of sorbic acid is in the range from 0.5 to 5.0% by weight, based on the weight of the feedstuff. Support for Claim 12 can be found in the Application-as-filed, for example on Page 7, lines 17 through 18 and Page 4, lines 5 through 16.

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Claim 13 is directed to further aspects of such advantageous embodiments, in which the solid feedstuff is extruded and/or pelletized and the feed additive consists essentially of sorbic acid and active enzyme. Support for Claim 13 can be found in the Application-as-filed on Page 7, lines 6 through 10.

Claim 14 is directed to agricultural livestock feedstuffs that include a liquid feed additive formed from a combination of sorbic acid and at least one added active enzyme, in which the concentration of sorbic acid is in the range from 0.5 to 5.0% by weight, based on the weight of the feedstuff, and at least 80% by weight of the sorbic acid used to form the liquid feed additive exhibited a particle size below 555 microns. Support for Claim 14 can be found in the Application-as-filed, for example on Page 4, lines 5 through 16 and on Page 7, lines 18 through 21.

Applicants respectfully submit that this response does not raise new issues, but merely places the above-referenced application either in condition for allowance, or alternatively, in better form for appeal. Reexamination and reconsideration of this application, withdrawal of all rejections, and formal notification of the allowability of the pending claims are earnestly solicited in light of the remarks which follow.

Claim Rejections - 35 USC § 112, Second Paragraph

Claims 8 and 10 stand rejected, and Claim 1 stands objected to, as lacking a reference point by which to determine the amount of sorbic acid. Without addressing the merits of this rejection, Claims 1, 8 and 10 have been amended to reflect that the recited sorbic acid amounts are relative to the weight of the feedstuff.

In contrast to the opinion urged within the Office Action, Claim 10 as amended clearly apprizes one skilled in the art as to the metes and bounds of the invention. Although the Examiner is correct in that the feedstuff is not positively recited as part of the combination of

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Claim 10, one skilled in the art would readily understand that the amount of sorbic acid to be added is based upon the amount of the feedstuff for which the recited additive is intended.

Accordingly, Applicant respectfully requests withdrawal of this rejection.

***The Claimed Invention is Patentable
In Light of the Art of Record***

Claims 1 through 3 and 8, 10 and 11 stand rejected as either anticipated by or obvious in light of United States Patent No. 3,988,483 to Deyoe. ("US 483"). Claims 4 through 7 stand rejected over US 483 in view of United States Patent No. 4,482,550 to Pais et al. ("US 550"). Claims 1, 3 and 8 through 10 stand rejected as anticipated by United States Patent No. 5,066,498 to McCauley III. ("US 498").

Claims 8, 10 and 11 stand rejected as anticipated by JP 73-007,060. ("JP 060"). Claims 8 and 10 stand rejected as anticipated by United States Patent No. 6,350,485 to Brunner. ("US 485"). Claims 8 and 10 stand rejected as being anticipated by Leahy et al. ("Leahy")

It may be useful to consider the invention before addressing the merits of the rejection.

Enzymes can be used to degrade anti-nutritional constituents of feed to such an extent that an increased availability of other nutrients is achieved. Enzymes are further known to loosen cellular wall structures, thereby increasing the digestibility of cellular wall constituents. Externally provided enzymes may also promote the formation of endogenous enzymes, as well, thus improving digestion. (The Examiner's attention is kindly directed to the Application-as-filed on Page 3, first full paragraph in its entirety).

Unfortunately, although benefiting animal digestion, the breakdown of high molecular weight feedstuff constituents also improves the opportunities for spoilage microorganisms to

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grow. Preservatives, such as bacteriacides and fungicides, are known. Preservatives derived from acids and/or salts thereof are well known. However, conventional wisdom to date has indicated that acids are detrimental to enzyme function, as evidenced by several of the cited references, i.e. US 483 (at Col. 7, lines 47 – 52) and US 485 (at Col. 5, lines 36 – 38).

Surprisingly, Applicant has found relatively elevated, yet nevertheless beneficial, amounts of sorbic acid that do not significantly harm active enzymes. More particularly, Applicant has discovered advantageous compositions that include moderate amounts of sorbic acid and active enzymes. The enzymes within the claimed compositions retain their activity upon subsequent application to feedstuffs.

The resulting feedstuffs provide a highly advantageous balance of improved digestible constituent content and longer shelf life. In addition, the feedstuffs of the invention unexpectedly provide a distinct improvement in growth rate and feed conversion, especially in piglet rearing. (The Examiner's attention is kindly directed to the Application-as-filed on Page 8, lines 4 through 10 and Page 3, line 25 – Page 4, line 2).

Accordingly, the claims are directed to agricultural livestock feedstuffs that include sorbic acid in the range from 0.2 to 5.0% by weight, along with at least one active enzyme. In particularly advantageous embodiments, the agricultural livestock feedstuffs of the invention include sorbic acid in the range from 0.5 to 5.0% by weight, as recited in Claim 12. In further advantageous aspects of such embodiments, the agricultural livestock feedstuff is extruded and/or pelletized and the solid feed additive consists essentially of sorbic acid and at least one active enzyme, as recited in Claim 13.

In alternative advantageous embodiments, agricultural livestock feedstuffs in accordance with the invention are in liquid form, as recited in Claim 14. In such advantageous liquid embodiments, at least 80% by weight of the sorbic acid used to form the liquid feed additive beneficially exhibits a particle size below 555 microns, as further recited in Claim 14.

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Applicants have determined that the recited beneficial particle size provides optimal uniform distribution of the sorbic acid.

The cited references do not teach or suggest the claimed feedstuffs.

US 483 is directed to methods of making liquid feed supplements using a hydrothermal cooker. (Col. 2, lines 26 – 38). The liquid feed supplements of US 483 include non-protein nitrogen. Exemplary non-protein nitrogens include urea and the like. (Col. 4, line 51 – Col. 5, line 2). The products of US 483 are believed to differ from conventional extrusion-processed products. (Col. 4, lines 2 – 6). US 483 touts that its process induces starch changes that may cause the resulting liquid to be more readily used by rumen microorganisms than conventionally processed solid forms. (Col. 13, lines 50 – 65 and Col. 4, lines 2 – 6). US 483 further discloses that solid products incorporating non-nitrogen protein may be toxic. (Col. 1, lines 39 – 44).

US 483 generically notes the use of any of a number of acids as mold inhibitors within its liquid products. (Col. 7, lines 2 – 8). US 483 further notes the use of amylase to lower the viscosity of feed which has been enriched with molasses. (Col. 7, lines 42 – 47). Upon sufficiently lowering the viscosity, acid is added to “to stop” the action of the amylase, i.e. acid is added to deactivate the amylase. (Col. 7, lines 47 – 52). US 483 is silent as to a recommended concentration range for the acid inhibitor, other than generically referencing “a small amount.” (Col. 7, line 49). As noted by the Examiner, US 483 does indicate the presence of phosphoric acid in specific amounts within the molasses enriched working examples, such as 1.0 and 3.6 wt %.

Applicant respectfully submits that US 483 thus does not teach or suggest the recited agricultural livestock feedstuffs that include from 0.2 to 5.0% by weight sorbic acid and at least one active enzyme, as recited in Claims 1, 8 and 10. US 483 likewise does not teach or suggest such feedstuffs incorporating from 0.5 to 2.0 % by weight sorbic acid and at least one active enzyme, as recited in Claim 2. Instead, US 483 instead teaches away from such embodiments, by

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indicating that even "a small amount" of acid deactivates enzymes. And US 483, briefly ~~noting~~ the use of amylase, does not teach or suggest the enzymes recited in Claim 3 as-amended.

US 483 further does not teach or suggest the solid feed additive of Claim 12. US ~~483~~, directed to liquid feed supplements, expressly teaches away from solid feed additives, by ~~noting~~ that they may be toxic. And US 483 most certainly does not teach or suggest solid feed ~~additives~~ incorporated into extruded and/or pelletized livestock feedstuffs, and especially not such ~~solid~~ feed additives consisting essentially of sorbic acid and at least one active enzyme, as recited in Claim 13. US 483, requiring liquid feed additives that include non-protein nitrogen source, strongly teaches away from such advantageous embodiments.

Nor does US 483 teach or suggest liquid feed additives comprising sorbic acid in which at least 80% by weight of the sorbic acid exhibits a particle size below 555 microns, as recited in Claim 14.

Accordingly, Applicant respectfully submits that Claims 1 through 3, 8 and 10 through 14 are patentable in light of US 483, considered either alone or in combination with the art of record.

Claims 4 through 7 are likewise patentable in further light of US 550.

US 550 is directed to the use of titanium complexes to promote weight gain in domestic animals. (Col. 1, lines 40 – 45). US 550 notes that any of a laundry list of preservatives may be added to fodder stored in a wet environment. (Col. 1, lines 53 – 58 and Col. 2, lines 23 - 26). US 550, considered in its entirety, notes that the preservative may be present in the feedstuff in amounts of up to 0.12 weight percent, based on the weight of the feedstuff. (Col. 1, line 66 – Col. 2, line 2 in conjunction with Col. 1, lines 59 – 67). US 550 generically discloses that the titanium complex may have a beneficial effect upon a domestic animal's endogenous enzymes.

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(Col. 1, lines 45 – 49). US 550 is silent as to the external administration of additional enzymes, however.

US 550, considered either alone or in combination with the art of record, thus does not teach or suggest the recited agricultural livestock feedstuffs that include from 0.2 to 5.0% by weight sorbic acid and at least one added active enzyme. US 550 instead teaches away from such feedstuffs by noting a maximum of 0.12 weight percent preservative and the presence of endogenous enzymes. Claims 12 through 14 are thus likewise patentable in light of US 550.

Applicant respectfully reiterates that there would have been no motivation to have combined these references. However, even if combined (which Applicant submits should not be done) the claimed invention would not result. As noted above, neither US 483 or US 550 teaches or suggest feedstuffs incorporating from 0.2 to 5.0% by weight sorbic acid, much less feedstuffs incorporating such amounts of sorbic acid along with at least one active enzyme.

Accordingly, Applicant respectfully submits that Claims 4 through 7 are patentable in light of the combination of US 483 and US 550.

The claimed invention is likewise patentable in light of US 498.

US 498 is directed to solid supplements that improve the skin, hoof and coat of domestic animals. (Col. 1, lines 12 – 16). The supplements of US 498 may be consumed as either a paste, meal or pellets. (Col. 3, lines 42 – 48).

The nutritional supplements of US 498 include a number of components, including methionine, an essential amino acid, and biotin. (Col. 1, lines 47 – 48). The methoionine is present both as DL-methionine and, optionally, as zinc methionine. (Col. 3, lines 36 – 42). US 498 particularly notes methionine as an amino acid that “must be consumed” in the diet of the animal. (Col. 4, lines 1 – 5). Biotin is similarly noted as “essential.” (Col. 4, lines 15 - 17). In

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addition, the supplement may further include yeast culture, said to be an excellent source of amylase. (Col. 4, lines 45 – 46). The supplement may further contain any of a generic list of preservatives. (Col. 4, lines 59 – 62). The preservatives may be included within the supplement in amounts of up to 0.4 % (based on the weight of the supplement).

In contrast to the opinion urged within the Office Action, the compositions are merely intended as supplements to feeds. The supplement is preferably included as a top dressing to the horse's "regular feed," although the supplements may alternatively be administered separately along with the feed. (Col. 3, lines 14 – 16). Applicants further respectfully reiterate that US 498 is silent as to the amount of supplement to be incorporated into (or administered along with) the feedstuff. Based upon the working examples, the preservative appears to be present within the resulting feedstuffs in amounts ranging from about 0.05 to 0.11 wt %. (Col. 6, line 1 – Col. 7, line 4).

Applicants respectfully reiterate that US 498 does not teach or suggest the recited agricultural livestock feedstuff compositions that include feedstuff and from 0.2 to 5.0% by weight sorbic acid based on the weight of the feedstuff, and at least one active enzyme, as reflected in Claims 1, 8 and 10. And US 498, briefly noting the use of amylase, most certainly does not teach or suggest the active enzymes recited in Claim 3 as-amended.

US 498 further does not teach or suggest the solid feed additive of Claim 12, incorporating from 0.5 to 5.0 % by weight sorbic acid. And US 498, expressly requiring methionine and biotin, most certainly does not teach feed additives consisting essentially of sorbic acid and at least one active enzyme, as recited in Claim 13. US 498 instead teaches away from such advantageous embodiments.

Nor does US 498 teach or suggest liquid feed additives comprising sorbic acid in which at least 80% by weight of the sorbic acid exhibits a particle size below 555 microns, as recited in Claim 14.

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Accordingly, Applicant respectfully submits that Claims 1, 3 and 8 through 10 and 12 through 14 are patentable in light of US 498, considered either alone or in combination with the art of record.

JP 060 is directed to liquid feedstuffs for silkworms. JP 060 indicates that a solid porous feedstuff pellet is initially formed, and then dipped into an aqueous solution containing a mixture that includes acrylic acid, vitamin C and choline chloride. The working example provided in JP 060 does not note the presence of enzymes. The working example of JP 060 does note the presence of sorbic acid within the aqueous solution used to dissolve the porous pellet. JP 060 also recommends a particular volume concentration for the sorbic acid within the aqueous solution. In contrast to the opinion urged within the outstanding Office Action, however, JP 060 discloses sorbic acid within the resulting dissolved silkworm feedstuff in an amount of 0.163 weight percent.

JP 060 thus does not teach or suggest the recited agricultural livestock feedstuffs, much less such livestock feedstuffs that include from 0.2 to 5.0% by weight sorbic acid and at least one active enzyme.

JP 060 further does not teach or suggest the agricultural livestock feed additive of Claim 12, incorporating from 0.5 to 5.0 % by weight sorbic acid. And JP 060, expressly requiring acrylic acid, vitamin C and choline chloride, most certainly does not teach feed additives consisting essentially of sorbic acid and at least one active enzyme, as recited in Claim 13. JP 060 instead teaches away from such advantageous embodiments.

Nor does JP 060 teach or suggest liquid feed additives comprising sorbic acid in which at least 80% by weight of the sorbic acid exhibits a particle size below 555 microns, as recited in Claim 14.

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Accordingly, Applicant respectfully submits that Claims 8 and 10 through 14 are ~~patentable~~ in light of JP 060, considered either alone or in combination with the art of record.

US 485 is directed to palatability enhancers that are applied to dry pet foods, particularly dry cat food. (Col. 2, lines 18 – 21; 29 – 35 and 48 – 50). US 485 more particularly discloses ~~that~~ tetrasodium pyrophosphate enhances the flavor of dry pet foods. The tetrasodium pyrophosphate may be present in amounts of up to 99% by weight. (Col. 2, lines 17 – 20). US 485 further discloses that preservatives may be added to the enhancer composition. (Col. 5, lines 36 – 39). As noted within the Office Action, the preservatives may be included within the palatability enhancer in amounts of up to 1.0 wt %, based on the weight of the enhancer. (Col. 4, line 2). However, the preservatives are be included *within the resulting treated pet food* in amounts ranging up to 0.03 wt % based on the weight of the pet food. (Please see Col. 4, line 2 – 3 (composition of liquid palatability enhancer) in conjunction with Col. 5, lines 2 – 4 (composition of resulting cat food)). Again evidencing the state of conventional wisdom regarding the inactivation of enzymes, US 485 notes that protease may be added to the enhancer composition and “later inactivated” with acid. (Col. 5, lines 36 – 38).

US 485 thus does not teach or suggest the recited agricultural livestock feedstuffs, much less such livestock feedstuffs that further include from 0.2 to 5.0% by weight sorbic acid and at least one active enzyme. In fact, US 485 teaches away from the recited amounts by noting the deactivation of enzymes by acids and incorporating minimal amounts of preservatives within the resulting pet food.

US 485 further does not teach or suggest the solid livestock feed additive of Claim 12, incorporating from 0.5 to 5.0 % by weight sorbic acid. And US 485, expressly requiring tetrasodium pyrophosphate, most certainly does not teach livestock feed additives consisting essentially of sorbic acid and at least one active enzyme, as recited in Claim 13. US 485 instead teaches away from such advantageous embodiments.

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Nor does US 485 teach or suggest liquid livestock feed additives comprising sorbic acid in which at least 80% by weight of the sorbic acid exhibits a particle size below 555 microns, as recited in Claim 14.

Accordingly, Applicant respectfully submits that Claims 8, 10 and 12 through 14 are patentable in light of US 485, considered either alone or in combination with the art of record.

Leahy is directed to the effect on beef cattle of sorbic acid and/or amylase within corn silage. As correctly noted by the Examiner within the Office Action of June 1, 2004, Leahy investigated the incorporation of 0.10 % sorbic acid within silage as a yeast, mold and bacteria inhibitor (Pages 490, 491 and 497).

Leahy does not teach or suggest the recited agricultural livestock feedstuffs that include from 0.2 to 5.0% by weight sorbic acid and at least one active enzyme, as recited in Claims 8 and 10.

Leahy thus does not teach or suggest the livestock feed additives incorporating from 0.5 to 5.0 % by weight sorbic acid, as recited in Claims 12 and 13. Nor does Leahy teach or suggest liquid livestock feed additives comprising sorbic acid in which at least 80% by weight of the sorbic acid exhibits a particle size below 555 microns, as recited in Claim 14.

Accordingly, Applicant respectfully submits that Claims 8, 10 and 12 through 14 are patentable in light of Leahy, considered either alone or in combination with the art of record.

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CONCLUSION

It is respectfully submitted that Applicants have made a significant and important contribution to the art, which is neither disclosed nor suggested in the art. It is believed that all of pending Claims 1 through 8, and 10 through 14 are now in condition for immediate allowance. It is requested that the Examiner telephone the undersigned if any questions remain to expedite examination of this application.

It is not believed that extensions of time or fees are required, beyond those which may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time and/or fees are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required is hereby authorized to be charged to Deposit Account No. 50-2193.

Respectfully submitted,

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I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office at facsimile number (703) 872-9306 on February 25, 2005.

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